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Review Article

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Exploring the role of City Networks in supporting urban resilience to COVID-19 in conflict-affected settings

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Abstract: Background: It is estimated that by 2050, almost 70 percent of the global population will be residing in urban areas. In recent years, cities have become central in tackling key urban challenges and have demonstrated greater flexibility in policymaking and innovation than national governments. Cities are currently more inclined to learn from each other via networks, partnerships, and pairings to develop solutions to many global challenges including pandemics such as COVID-19.

Aim: To explore the role cities and city networks present in supporting urban resilience to pandemics focusing on conflict-affected settings.

Methods: A desk-based literature review of academic and grey sources was conducted followed by thematic analysis.

Results: Although most COVID-19 response plans have been developed and implemented by governments, the pandemic has revealed the significant potential for city networks in providing platforms for knowledge sharing and coordination of mitigation plans to address pandemic-specific interventions. We found that in conflict set-

tings, city networks continue to play only a minor role, if any, compared to humanitarian and informal actors.

Conclusion: City networks have the potential to contribute to strengthening global collaborative approaches to pandemic responses, but this has not been given sufficient investment and even less so in conflict-affected settings. It is essential for these networks to be integrated within a wider multidisciplinary and multisectoral platform that includes academics, humanitarian and informal actors.

Keywords: cities, city networks, pandemics, COVID-19, conflict

1 Background

The main aim of this paper is to provide an overview of previous and current responses of cities to contemporary pandemics (since 2000) and to evaluate the scope for city networks to contribute to measures combating pandemics in conflict-affected urban contexts in light of their current role in tackling the COVID-19 pandemic.

As major economic dynamos, cities have offered higher standards of living than rural areas for centuries, rendering them central sites of migration for populations seeking better living standards and opportunities [1,2]. Unprecedented waves of urbanisation in terms of scale and pace have arisen in recent years, especially in low and middle-income countries, so that as of 2019, around 55 percent of the global population (more than 4.2 billion people) live in urban areas; with the percentage expected to increase to 68 percent by 2050 (86 percent for high-income countries and 67 percent for low and middle-income countries [LMICs]) [3]. Furthermore, 96 percent of all urbanisation is occurring primarily in Sub-Saharan Africa and Asia [4,5]. Consequently, cities are increasingly at the forefront of global efforts in international development, such as the New Urban Agenda and Sustainable Devel-

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opment Goal (SDG) 11 on inclusive, safe and sustainable cities [3]. They are also at the core of development projects which focus on improving livelihoods in urban contexts such as sustainable urbanisation, urban resilience and health [6]. “New localism”, characterised by the devolution of managerial power to the local level in order to implement national goals, is flourishing in cities, and plays a central role in tackling city-based challenges such as, urban violence, housing, slums, transportation, waste management, air quality and pandemics [7–9].

Armed conflict and political violence contribute another significant dimension to the urban challenges that cities are already struggling to tackle. Recent studies have shown that conflict trends have dramatically changed post World War II, tending to be more intrastate (or in some cases such as Yemen and Syria, internationalised proxy-wars) in nature, rather than interstate and with the number of refugees and internally displaced populations increasing tremendously [10,11]. As of 2020, 70.8 million people were forcibly displaced with approximately 61 percent of all refugees and 80 percent of internally displaced persons (IDPs) living in urban areas [12,13]. As the world rapidly urbanises, cities are increasingly bearing the brunt of armed conflicts, humanitarian crises and disasters. On the one hand, armed conflicts are becoming increasingly complex, causing widespread destruction in cities. On the other, cities are the preferred destination for millions of people fleeing armed conflicts and disasters [14]. As a result, many of the worst contemporary humanitarian crises and forced displacements of civilians are taking place in cities such as Sanaa, Aleppo, Kabul, Gaza, Maiduguri, and Bangui, amongst several others [15]. Globally, around 50 million people affected by armed conflict live in fragile cities where the social contract has broken or is particularly weak [16]. In these cities, the impact of pandemics such as COVID-19 will be profound.

It is surprising that, given the increasing recognition that the SDGs are interlinked, there is nothing within SDG 11, and little in the New Urban Agenda as a whole, that specifically addresses pandemic preparedness in cities [17]. More than 1,430 cities in 210 countries have been affected by COVID-19 and over 95 percent of total cases have been found in urban areas [18]. Cities with a high concentration of urban poor and deeply entrenched inequalities are potentially more vulnerable than those that are better resourced, less crowded, and more inclusive [19]. The urban resilience agenda constitutes an important opportunity for joined-up efforts at the municipal level to tackle pandemic threats. Ribeiro *et al.* 2019, have reported that the main aim of urban resilience “is to reduce the impacts resulting from a disturbance, a concept transversal to

various research agendas with very similar definitions” [20]. Lessons learned from urban resilience programmes working on issues such as climate change offer important insights regarding the role of urban systems in the prevention of potentially catastrophic threats such as COVID-19 and other pandemics. The key characteristics of resilience approaches outlined by Ribeiro encompass “resisting, recovering, adapting and transforming” to external pressures. Such concepts are readily applicable to the domain of infectious threats and provide a roadmap to address unique vulnerabilities within the urban system.

The convergence of conflict, urbanisation, and pandemics necessitate innovative urbanised solutions that improve the safety of conflict-affected populations during global crises. Equally relevant is the notion that resilience in these varied contexts will be influenced strongly by local factors and community characteristics. Resilience is not a homogenous state, rather a dynamic objective that incorporates unique and varied pressures. With the increasing prominence of cities in global agendas, city networks raise a number of possibilities for harnessing municipal power to fulfil policy objectives and enhance resilience at multiple levels. Existing programmes have shown that cities can harness effective collaboration for a variety of ends from peace-building, economic development, climate change and capacity strengthening [21].

2 Methods

This study is based on a desk-based review of academic literature from Google Scholar, PubMed and Scopus. Due to the novelty of the topic, and the wide range of sub-topics, and number of cities, it was not possible to conduct a systematic review of the literature. We therefore focussed efforts on an extensive review of grey sources as our initial searches of Google showed that several reports focusing on the response to pandemics in urban settings, especially to COVID-19, are published by United Nations (UN) agencies, humanitarian agencies, non-governmental organisations (NGOs), websites specifically focussed on cities, governments, philanthropic groups and other related forums. Our grey literature sources included Reliefweb, Devex and Google. We limited our search to material published between 2000 and July 2020. Further searched websites included those of leading international humanitarian agencies (such as Médecins Sans Frontières [MSF], International Committee of the Red Cross [ICRC] and International Rescue Committee [IRC]) as well as other global organisations such as the World Bank, the International

Table 1: Key definitions

Armed conflict	Armed conflict is a contested incompatibility, which concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths. This includes international conflicts between two or more states and non-international conflicts (or civil conflicts) between governmental forces and non-governmental armed groups [22].
City	A concentration of people in a geographic area who can support themselves from the city's economic activities on a fairly permanent basis. The city can be a centre of industry, exchange, education, and government or involve all these activities. These diverse areas of opportunity attract people from rural areas to cities [23,24].
City networks	Formalised organisations with cities as their main members and characterised by reciprocal and established patterns of communication, policy-making and exchange. These include associations of three or more cities, which meet periodically to discuss issues of mutual concern, lobby lawmakers or work on joint initiatives. These could be both international institutions and domestic institutions created to represent cities in national politics [25,26].
City Resilience	The capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience [27].
International Health Regulations (IHR)	The IHRs (2005) represents a binding international legal agreement involving 196 countries across the globe, including all the Member States of the World Health Organisation (WHO). Their aim is to help the international community prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide [28].
New Urban Agenda (NUA)	The NUA was adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador, on 20 October 2016. It includes some 197 member states. It represents a shared vision for a better and more sustainable future [29].
Pandemic	The worldwide spread of a new disease [30].
Public Health Emergency of International Concern (PHEIC)	PHEIC is defined in the International Health Regulations (IHR) as an extraordinary event which is determined to constitute a public health risk to other states through the international spread of disease and to potentially require a coordinated international response [31].
Urbanisation	Urbanisation involves the shift in population from rural to urban settlements. From a demographic perspective, the urbanisation level is best measured by the urban population share, with the urbanisation rate being the rate at which that share is growing [32].
Urban Health Security	This is a concept that encompasses activities and measures in an urban setting that mitigate public health incidents to ensure the health of populations. Health security is an evolving paradigm within the fields of International Relations and Security Studies [33].
Urban Resilience	The capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience [27]. Its constituent elements include preparation, absorption, recovery, and adaptation to an adversity [34].
Sustainable Development Goal (SDG) 11	To make cities inclusive, safe, resilient and sustainable by achieving a set of 11 targets specified by the UN [3].

Monetary Fund, the World Economic Forum, Organisation for Economic Co-operation and Development (OECD), ALNAP and relevant United Nations agencies such as (UNDRR, UNHCR, WHO, UNICEF, ICLEI and OCHA). We then reviewed literature on responses to pandemics at city levels across a typology of settings (high-income, middle-income, low-income, post-conflict, conflict-affected, humanitarian crisis and disasters). We also combined these searches by reviewing media coverage and opinion pieces published in leading newspapers such as the cities

section of the Guardian, the New York Times, and the Washington Post. We also searched websites of additional city networks (Table 2) that appeared in any of the relevant and selected literature.

English language search terms were used to source the material for this study. Examples of search terms included: urban settings, cities, urban resilience, city partnerships, city networks, municipals, COVID-19 response, conflict, war, humanitarian settings, international and global governance, pandemics, Ebola response, SARS,

history of pandemics, policies of pandemics, knowledge sharing between cities, mayors, and mayoral response to pandemics. In addition to these search terms, a number of key concepts and ideas are referred to throughout this paper and are defined in Table 1.

Our aim was to determine the main responses to pandemics in cities since the beginning of the millennium (year 2000), including those impacted by conflict, and the role that cities and/or city networks have in fighting pandemics.

Our approach was divided into four stages: searching for abstracts and other reports based on key words; selecting references for detailed reading by all authors; identifying recurring themes from selected references; and aggregating these themes. Thematic analysis, as described by Braun and Clarke, and interpretation of evidence from published and grey literature were used in order to capture any emerging key themes [35].

Limited literature related to cities and pandemics existed before the emergence of the COVID-19 pandemic [36]. Urban research related to previous pandemics is mainly focused on issues such as inequalities that make poor and marginalized groups more vulnerable to pandemics [37]. Exploring the role of city networks and city collaborations in light of pandemic preparedness is a nascent area of research. We screened just over 200 papers and reports and found 83 relevant ones which were reviewed and critically discussed. Of these 38 were from peer reviewed academic articles, 33 were from grey literature sources from humanitarian and development organisations, and 12 from online news sources.

Following thematic analysis of the material collected, three major key themes emerged which are discussed in the sections below. These are: 1 – cities and previous pandemics, 2 – COVID-19 response in cities, with a sub-theme focusing on the response in conflict settings, and 3 – city networks and partnerships including two subthemes, regulations and protocols, and role of networks in the COVID-19 response.

3 Findings

3.1 Cities and pandemics since 2000

A series of global health crises have emerged since 2000; Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), pandemic Influenza A (H1N1), Ebola Virus Disease (EVD), Zika, and currently, Coronavirus (COVID-19). Previous city responses during

these recent pandemics allow us to better understand the responses required for emerging global health threats and draw on lessons learned to improve future responses. This is imperative in an era of rapid globalisation, urbanisation, and health security [38].

SARS was first reported in Asia in 2003, spreading to more than 24 countries across North America, Europe and Asia before being contained [39]. One of the critical lessons from the SARS outbreak was the necessity to coordinate available international resources in an outbreak and to focus them on identifying priorities and solving problems [40]. SARS taught the global community to better understand how our international system is centred on global cities and how quickly epidemics can become pandemics [9]. Subsequently, various international platforms and organisations were created to manage pandemics, including the Global Outbreak Alert and Response Network (GOARN), the Coalition for Epidemic Preparedness Innovations (CEPI), the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R) and the Global Initiative on Sharing All Influenza Data (GISAID). These organisations provide a forum where those with relevant expertise and capacity contribute to managing new threats and developing innovative solutions to emerging problems [40].

The EVD was first discovered in 1976 and various outbreaks have since occurred in African countries. The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests [41]. The 2000 outbreak in Gulu, northern Uganda, differed from previous outbreaks, demonstrating the transmission of the disease from rural to urban settings, spreading through slums and IDP camps [42]. The 2014–2016 EVD outbreak in West Africa was the largest and most complex to date; there were more cases and deaths in this outbreak than all others combined, and it was the first mass outbreak in an urban environment and in one of the fastest urbanising regions in the world [43,44]. In both of these instances, the EVD outbreak highlighted that measures implemented in a top down approach with poor communication to those affected, led to a deeply flawed response [45]. It further identified a decentralised and localised approach with community mobilisation as critical to effective disease control [46]. Failure to control transmission in the early phases of the outbreak allowed mobile populations to spread transmission chains from rural to urban areas. In Nigeria, the number of cases was limited despite the introduction of infection into the large cities of Lagos and Port Harcourt; the critical determinant of epidemic size appears to be the speed of implementation of rigorous control measures [47]. An important lesson is early detection and response,

and strengthening international partnerships and collaborations to support the building of comprehensive health systems for surveillance and care [42].

The 2008 WHO symposium on *Cities and Public Health Crises* noted many relevant lessons for recent pandemic responses across the globe, including; the impracticality of isolation and quarantine in large cities; the social and economic implications of social distancing; and the importance of trust, clear messaging and community and stakeholder engagement [48]. Some argue that the lessons learned from recent disease outbreaks have been short sighted [9,49]. Criticisms of the international EVD response include allegations that quarantine policies provoked violence, and that the failure of some international agencies to partner successfully with local government agencies and civil society organisation hampered effective responses, as well as insufficient efforts to build capacity for the future [50–53].

3.2 City responses to COVID-19

Cities that adopt comprehensive, multi-sectoral policy responses are better equipped to manage pandemics than those that are not [19]. The early responses of Taipei (Taiwan), Hong Kong and Seoul (South Korea) to the COVID-19 outbreak are exemplary. These cities applied lessons from past disease outbreaks with the investigative capacities, health systems and, importantly, the effective leadership in place to rapidly take decisive action [19,54,55]. Additionally, the number, quality, accessibility, and surge capacity of hospitals, intensive care units, hospital beds and respirators can determine whether a city manages a pandemic effectively. Seoul took a leadership role in the immediate crisis response, through the installation of crisis centres, social distancing, and mandatory masks on public transport. Such measures were then adopted nationally afterwards. As cities are coming out of emergency phases, and defining recovery strategies, some are further calling for more financial support from higher levels of government, as well as more budgetary flexibility, to ensure long term responses are adapted to local needs, and invest in increased resilience, sustainability, and equity [54]. These examples of good practice highlight interconnected role of the *recovery* and *adaptation* phases of resilience approaches, embedding practice undertaken during crises to contribute to ongoing recovery and strengthening efforts. For example, the government of Taiwan has continued to experiment with new approaches to preparedness and response that include incorporating different levels of state and nonstate actors

in collaborative efforts, including specific city strategies – a combination of proactive surveillance, routine communication, rapid isolation and personal and community protection measures that were critical [56]. Taiwan's collaborative approach facilitates trust building and understanding of local conditions and vulnerabilities while enhancing capacities and more effectively allocating resources for pandemic prevention and control, which will persist beyond the current COVID-19 crisis [56].

Smart Cities solutions have also proved useful for curbing COVID-19. Examples include; remote temperature monitoring systems; real-time heatmaps of crowding in public spaces; drones spraying disinfectants; and, robots acting as “safe-distance ambassadors” [57,58]. Smart city initiatives have been researched primarily in the high-income context, including Singapore, New York, Seoul, and Amsterdam. In such contexts, emerging technologies are enabling progress on urban functionality, productivity, communication, and liveability. While challenging in resource-scarce settings, these initiatives also present opportunities for low and middle-income countries to manage the impacts of rapid urbanisation and pandemic associated challenges [58–60]. Such initiatives may also support enhanced data sharing at the municipal level, in turn supporting earlier detection of disease outbreaks [57]. It must, however, be acknowledged that such approaches are not uncontroversial, with privacy and regulation implications. On the one hand they open up avenues of local leadership, but on the other they introduce significant commercial interests in population data. Some experts have noted that although technology can be helpful in supporting certain objectives including contact tracing, mass surveillance is not necessary to contain the virus and they should be used in tandem with a range of other established measures, frameworks and protocols that seek to maintain a good balance between the protection of privacy rights and public health [54,61].

City responses have been supported by various Mayoral initiatives. Mayors the world over are faced with increasing pressures and diminutive authority, often limited data (in capacity, geospatial coverage, and level of accuracy), and global connectivity challenges amid closing borders and growing nationalist sentiments [9]. In this context, it is fundamental for local and national governments to understand the extent of the urban experimentation occurring in urban areas worldwide, and temporary measures can teach us a great deal about the possibilities for reform [9]. Many enlightened and open-minded municipal leaders are stepping up to drive policy forward as national politicians take a step back. For example, Michael Bloomberg implemented the Coronavirus Local

Response Initiative to provide cities with virtual technical assistance, coaching, and accurate information urgently needed by local leaders on the frontlines [62]. In Brazil, mayors and governors are incorporating successful pandemic responses from other cities. Mayor Rodrigo Neves of Niterói in the state of Rio de Janeiro, has held regular video calls with the head of a coalition of favela residents' associations during the pandemic and has stated that "effective measures that are not expensive are possible if you are well-coordinated" [63]. Despite their central role, Mayors are seldom integrated into global pandemic preparedness governance initiatives. The formation of an international network of mayors focussed on pandemic preparedness constitutes a logical step for better engaging arguably one of the most important urban actors in outbreak response [62,64]. While these standalone mayoral and city-wide responses are of significance, they need to be part of the wider, collaborative approach to strengthen urban resilience.

The state has proven only partially effective during COVID-19 with centralised governments demonstrating weaknesses in addressing the pandemic. The pandemic has shown repeatedly that deploying agile interventions coupled with strong coordination at both central and local levels is critical to delivering timely and effective interventions at scale [65]. It is therefore vital that municipal leaders have the adequate tools to act appropriately in response to public health crises [56]. In Brazil, community organisations, local officials, and private donors have been responding to the crisis in the absence of effective governmental leadership. An important decision in the early months of the pandemic was the Federal Supreme Court's recognition the legality of physical distancing policies imposed by state and municipal governments, limiting the President's attempts to weaken workplace closures [66]. In the Paraisópolis favela of São Paulo, "block presidents" monitor the health of 50 families each, 240 volunteers have been trained as emergency first responders, and residents displaying symptoms receive care via telemedicine. More than 365 other informal settlements across Brazil are adopting similar measures [63]. COVID-19 task forces have been established in various cities in the United States across multidisciplinary bodies to design or advise on response strategies, including Chicago, Washington and Los Angeles [54]. In the United Kingdom (UK) city of Bristol, the Mayor is keeping residents up to date through video messaging. Bristol has also developed a city-wide COVID-19 response team, the approach allows for cross-city action and decision-making [54]. Some national government measures have included the implementation of local lock-down measures, often in cities, as further waves

of COVID-19 impact cities differently, including Beijing (China), Seoul, Leicester (UK), Nairobi and Mombasa (Kenya) [67–69]. Cities in India have also implemented varying degrees of lock-down measures, including Delhi, Mumbai and Chennai [70]. Different approaches and policies in various urban contexts demonstrate the need for decentralised and flexible policy making in pandemic management and response.

3.2.1 Regulations and frameworks

Very few of the key lessons over the past 20 years that support urban resilience during disease outbreaks have been implemented into the policy and practice of COVID-19 responses. The traditional expectation has been that pandemic preparedness and response is a state responsibility [56]. This has been enshrined in international law, with the International Health Regulations (IHR) mandating that WHO member states have a duty to "develop certain minimum core public health capacities" [71]. In practice many member states struggle or fail to implement and comply with IHR regulations [72]. At a municipal level, it is expected that events involving disease or excess mortality will be reported to the national focal point, in turn reporting back to WHO [48]. Subsequently, the city, under the IHR, has not constituted a governing locus of health security. Similarly the Sendai Framework for Disaster Risk Reduction 2015–2030 focuses on national rather than local responses which has made it subject to criticism as it does not adequately consider the multiple political, social and economic dimensions of risks in urban settings that result in increased vulnerability and decreased resilience of health services in urban settings in the face of adversities [73]. The Global Health Security Agenda (GHSa) supports and complements the implementation efforts of the IHR, however it too focuses on national and regional capacities [74]. Upon examining the criteria of the Joint External Evaluation (JEE) framework, which monitors compliance with the IHR, and the GHSa, opportunities for cities to harness their specific policy and governance capabilities to fulfil the requirements laid out by the regulations become apparent [75].

Given that disease outbreaks often emerge at the periphery of cities and the majority of the global population live in close proximity, developing frameworks that enhance municipal level information sharing and accountability as part of state compliance with IHR could prove a useful mechanism to share knowledge and prevent future public health crises. Strengthening the IHR could build broader capacities with local relevance and thus

local buy-in and sustainability [19,48,76]. Proponents of stronger global health governance often focus on the lack of “architecture” under which state and non-state actors could harmonise their policy goals and programme activities. Ultimately, many of these limitations reflect frustrations with the failures of states to build sustainable local public health capacities, and to use these as a platform for interaction with global health activities [77].

Urban resilience as a key component for health security opens up new opportunities for interventions. Devolving core public health functions to municipal leaders through frameworks and regulations, including the IHR, JEE, Sendai Framework, and GHSA could strengthen health security and promote urban resilience. Current urban resilience frameworks are applicable to a variety of emergencies and disasters and some are specifically designed to combat climate change impacts, for example. However, in all available global examples, outbreak and epidemic/pandemic events are either only mentioned as a sub-category (for example in The World Bank) or are not included at all [78]. Much of the work on urban resilience frameworks in disease outbreaks are either included as part of those overarching frameworks and tools, or are merely a set of guidelines and recommendations that may not be specific enough to address the resilience of multiple systems and sectors in the city during these unique events [79]. Embedding an understanding within policy spheres that cities are important focal points in the international governance system, and that epidemics can rapidly be transformed into pandemics within urban contexts is crucial to strengthening health security frameworks and responses.

Current city responses are not always feasible in resource scarce urban settings, or for those impacted by other challenges. What happens when cities that are gravely impacted by pandemics do not have the investigative capacities, health systems, or adequate leadership to implement rapid measures? Informal settlements in urban settings, internally displaced populations, cities wracked by conflict: these settings are often already hampered by the lack of readily available resources, which greatly impacts a city’s ability to implement appropriate pandemic responses. Much of the COVID-19 response focuses on high-income countries affected by the pandemic, which has principally driven the international response. It has become quickly evident that many of the health interventions deployed in high-income countries, and their cities, may be ineffective or even infeasible in LMICs [80], let alone conflict settings already constrained by resource availability. Policies of social distancing, self-isolation, hygiene measures including increased use of personal

protective equipment (PPE), shielding, test-and-trace protocols and quarantining are all very resource intensive. It is extremely challenging, if not impossible, to implement these policies in conflict settings [81,82].

3.2.2 COVID-19 response in cities in conflict

The COVID-19 pandemic is affecting virtually every country and city across the globe. However, not all populations and countries are affected equally as this global pandemic interacts with existing political and security vulnerabilities, inequalities and gaps in institutional capacity. Many cities in Africa, South and Southeast Asia, and Latin America are facing much greater direct and indirect threats from COVID-19 than their counterparts in North America, Western Europe, or East Asia. Among the most at-risk are large and secondary cities in fragile and conflict-affected countries such as Afghanistan, Colombia, Democratic Republic of Congo (DRC), Iraq, Libya, Yemen, Myanmar, Nigeria, Somalia, South Sudan, Syria, and Venezuela. As exemplified in previous pandemics, pandemics affect societal inequality and those at greatest risk are often those already marginalised, shedding light on existing veiled inequalities [83,84]. Past pandemic responses have also resulted in limited post-pandemic actions towards reducing inequalities and addressing the needs of marginalised groups. It is hoped that more efforts towards solving these issues through more inclusive planning will be made in the post COVID era [83]. Sharifi and Khavarian-Garmsir’s study states that overcoming inequality challenges can also enhance resilience to other threats, for example conflict and climate change impacts, that tend to affect vulnerable groups disproportionately [37]. Moreover, inequalities may not only make containment challenging, but result in further diffusion of the virus. Therefore, social distancing policies should not be implemented in isolation from economic support mechanisms [37].

Health surveillance and treatment capacities are already overburdened and under-resourced in conflict settings. The lack of basic infrastructure, such as water and sanitation, forced displacement and crowded camps, and the absence of strong national leadership on health security issues put these settings at a greater risk during pandemics [85,86]. While the populations in these settings tend to be younger, many households are already under- or malnourished and the danger of comorbidity is significant. Adapting the pandemic’s surveillance and control strategies to violence and conflict settings is a critical challenge for cities in fragile settings and their health

systems [87]. In some contexts, conflict risks may be predictable, however, pragmatism is required as escalating violence will quickly overwhelm even the best prepared city. The UN Secretary-General António Guterres's call on 23 March 2020 for global ceasefire to focus on fighting the pandemic was endorsed by 70 member states, including fighting parties in Cameroon, Central African Republic, Colombia, Libya, Myanmar, Philippines, South Sudan, Sudan, Syria, Ukraine and Yemen. However, multiple incidences of ceasefire violation were soon after reported in Yemen, Iraq, Syria and Libya [88–91].

To improve urban resilience against the pandemic in such settings, multiple stakeholders who are less likely to be involved in more stable settings, have proven to be vital to complement, if not replace, governments whose financial, regulatory, legal and health systems are dysfunctional or at best in a state of limbo. Stakeholders include humanitarian and relief agencies, local NGOs, civil societies and the diaspora. Many of these actors, who have been active in such settings well before the pandemic, understand the context of each conflicted region and its health and governance systems and thus are capable of introducing tailored measures and responses that build resilience. International development agencies, including the World Bank along with UN agencies (United Nations High Commissioner for Refugees [UNHCR], United Nations Relief and Work Agencies for Palestine Refugees in the Near East [UNRWA], World Food Programme [WFP]) and humanitarian actors who are already providing humanitarian services in these settings such as MSF and ICRC have tailored their ongoing activities to fit with the current situation. The UN has also initiated a “COVID-19 Global Humanitarian Response Plan” that focuses on specifically fighting the pandemic while addressing humanitarian needs. These agencies are working in collaboration with local governments to strengthen health systems and to limit the spread and mitigate the risks associated with COVID-19 in the most fragile settings such as the DRC, Mali, Niger, Papua New Guinea, Haiti, Afghanistan, Yemen and the West Bank and Gaza [92].

Most agencies' operational activities are planned at the country and regional level with little attention to the city level, despite the humanitarian field witnessing the greatest shift towards urbanisation. Sixty percent and eighty percent of all refugees and IDPs respectively – live in urban areas; even the classical connotations of refugee camps are currently being redrawn. For example, the Za'atari refugee camp is sometimes referenced as the fourth largest city in Jordan [93]. Some humanitarian agencies have been tackling the pandemic through decentralised mobilisation of resources with a central focus

on community engagement. Most of these efforts are for preventative measures. For example, in Niger, UNHCR has trained Malian refugees to prepare masks for both refugees and host communities to ensure social cohesion, a necessity for resilience, in such hard times [94,95]. UNHCR also sponsored local campaigns composed of music videos, songs and public service announcements to fight the ‘infodemic’ – the wide and rapid spread of misinformation – around COVID-19. Similar approaches were also reported by other humanitarian actors in different settings [96–98].

However, given the complexity of most conflict settings, humanitarian actors need to cooperate with state and non-state armed actors as witnessed in Syria, Afghanistan, Yemen, and the Philippines [99,100]. Fragile agreements, limited movement, jeopardised safety and other financial and logistical barriers can limit the impact that the humanitarian sector can have on strengthening COVID-19 resilience in cities affected by conflict. This has led to the rise of locally based innovative approaches for the containment of COVID-19, which also take into consideration the measurements set by the governing bodies [101]. For example, the lack of physical presence and the enormous geopolitical challenges for cross-border response from Turkey to opposition-held northwest Syria limits WHO's response in this region. Building on lessons learnt from previous polio and seasonal influenza outbreaks, a locally formed surveillance system-Early Warning and Response Network, developed mechanisms of predicting risk and strengthening surveillance for COVID-19. Bottom-up local entities, such as the Idleb Health Directorate and the White Helmets, were key for technical governance. Calls for a mass voluntary campaign “Volunteers against Corona” have resulted in scaling up of community engagement where thousands of volunteers to cover most areas in the region and provide awareness, disinfection campaigns and community-based referrals. The Syrian medical diaspora also had an important role in providing the latest evidence on the virus by establishing central chat rooms on WhatsApp for daily updates. Online trainings were also made available especially for field health workers [102].

Similarly, due to lack of funding for the UNRWA, the densely populated Palestinian refugee camps and urban settlements in Lebanon have also had to rely on local community-based initiatives to promote resilience [103]. A total of 12 refugee camps, hosting 470,075 registered refugees are under the control of the various Palestinian political factions rather than the Lebanese government due to an agreement after the end of the Lebanese Civil War in 1990. Therefore, the Lebanese government has no legal

commitment to these refugee camps as the major health-care provider there is the UNRWA [104]. However, the Ministry of Public Health in Lebanon, together with the Palestinian factions, have coordinated effectively to ensure that the preventative measures and curfews applied in the camps are in accordance with those set by the Ministry. Moreover, faith-based NGOs and NGOs affiliated with Palestinian political factions mobilized local groups for mass funding, disinfection and awareness campaigns. Awareness campaigns were extensively broadcasted on local radio stations with local authorities in charge of distributing aid to mitigate the economic burden of the pandemic. Local actors tend to know residents of these camps and thus are capable of approaching them, even the most vulnerable who are usually marginalized and forgotten in large-scale relief projects [103]. Due to such measurements, only ten cases have been reported in the Palestinian Refugee camps so far all of which have been traced for containment [105].

Adaptation is a critical resilience challenge for cities and their health systems, especially those existing in fragile settings. The C40 network has described the concept of *adaptation* as a critical phase in risk management in the context of climate change – this principle however remains germane to threat of epi-pandemics in urban settings [106]. Adaptation activities that strategically address specific outbreak risk factors, for example hygiene regulations in wet markets, are contributory to the broader resilience of a city system to pandemic threats. It has been established that emphasising the need for planned micro- and macro- adaptations encourages focused action at the policy and individual actor level [107]. Translating this understanding of strategic communication and action into effective, interconnected resilience approaches is empowering for municipal actors able to take steps in various domains of social and regulatory power.

Although humanitarian organisations are increasingly conscious of the growing need for integration of cities into broader health security agendas, the link to specific health system requirements in urban settings is an area that is currently under-evaluated. Building health systems that can withstand epi/pandemic shocks will always be subject to the prevalent geopolitical and strategic dynamics at play in any given setting. Deploying the power of city governance with policy-makers, humanitarian actors and the private sector has the scope to integrate risk analyses of a critical sector into longitudinal planning for fragile cities and regions. Such an approach requires a departure from traditional approaches to insecurity led by humanitarian actors. As the ICRC explicitly states, each

operation is weighed on operational benefits vs. risks involved. Under the Seville Agreement the ICRC is responsible for establishing, managing and maintaining a security framework using its “pillars of security” framework as a point of reference [108]. How this context specific evaluation might interface with broader concepts of urban and health system resilience is as yet underexplored.

Little, if any, is mentioned in the literature about existing city partnerships or networks that are contributing to urban resilience in conflict settings. There are calls, however, for promoting partnerships within the humanitarian-development-peace nexus to help manage the immediate health needs, strengthen governance, mitigate the long-term impact of the pandemic, sustain peace and safeguard health systems. The New Way for Working of the UN, launched after the World Humanitarian Summit in 2016, emphasises the importance of strengthening the humanitarian-development integration with increased localisation; however, further effort on cities and municipalities is needed [109]. In conflict settings, where cities have minimal power, multi-sector coordination is essential to fight pandemics and promote resilience. In cases where the governing bodies are not up to the challenge, or governance is too complex, local actors at the community level play a primary role in efficient response to pandemics.

3.3 City networks and partnerships

Many of the lessons learned and actions for implementation going forward rely on state, city and local collaborations. While crucial, there is little discussion on the importance of city-to-city networks, which may not only enhance individual city responses, but also improve state, city and local collaborations. A recent report from the OECD on city responses to COVID-19 states that city-to-city cooperation during the pandemic within countries and beyond national borders has been a key to success for cities dealing with the pandemic; peer-to-peer exchanges between cities create unity, solidarity and promote openness and transparency, while city networks are providing useful information on best practices to tackle the crisis and recover effectively, taking into account economic, social and environmental objectives [54]. A pandemic preparedness index at the city level may assist in strengthening pandemic preparedness and responses. It could also aid in creating established and tested protocols, more effective provider education, and enhanced collaboration between qualified health care workers from the state to the local levels to overcome the gaps created by a lack of

governance, poor planning and decentralised health care systems [19].

Incorporating and evaluating local-level public health capacities is an important process for identifying strengths and weaknesses that can impact the preparedness for, detection of and response to health security threats and ultimately reinforce urban resilience. National and local urban observatories affiliated to the Global Urban Observatory, managed by UN-Habitat, make up a local and global network of local data producers. Urban observatories include trained urban data practitioners with a mandate to gather data, along with knowledge of where essential urban data can be sourced and where it should be channelled and reported to support response planning [53]. Currently, there are no readily available health security assessments for the local-level [110]. The Center for Global Health Science and Security at Georgetown University created an evaluation tool – the Rapid Urban Health Security Assessment (RUHSA) – as a resource for assessing local-level public health preparedness and response capacities. It was designed to help city decision-makers prioritise, strengthen, and deploy strategies that promote urban health security and address the absence of local-level assessment tools to support decision making for municipal leaders [110]. The tool has potential applications for immediately informing outbreak response efforts, long-term capacity development initiatives and enabling for municipal leaders, national leaders, researchers and other experts to identify the strengths and weaknesses of their local-level health security systems [110]. Such platforms are crucial, particularly at a time when international and national leadership is proving inadequate.

3.3.1 City partnerships for COVID-19

The proliferation of urban challenges means many cities use city networks and collaborations for various purposes, including strengthening resilience to an array of economic, environmental and social threats. Strengthening resilience requires looking at a city or any community holistically – understanding its systems, their interdependencies, and the various shocks and stresses it may face. Resilience projects are designed holistically to ensure that multiple benefits are obtained from any single intervention.

There are numerous examples of city networks and collaborations established globally. Below, we summarise 12 leading city networks that are establishing urban resilience (Table 2).

To enhance the crucial role that city partnerships and networks are playing in improving preparedness and response to the COVID-19 pandemic, attention should also be given to informal networks that are key players in the fight against COVID-19. Informal networks include community organisations and faith-based groups who are stepping in to assist people during the COVID-19 pandemic by targeting gaps that are not available in national government responses. Such networks are better at reaching out and engaging with local communities, especially the vulnerable populations who need additional support. They are involved in collecting funds, distributing food and basic supplies, disinfecting areas, thwarting misinformation, and building solidarity [124,125]. Some networks are identity based, for example religion or location, creating cohesion that motivates people to respond directly in times of crisis and making it easier to gain local trust and thus access to a larger number of households [126]. For example in South Africa, where the spike in domestic violence is considered a major concern at the country level, little attention was given to targeted violence against individuals experiencing addiction withdrawals while in lockdown which was determined by faith-based local communities [127]. The local community has proven to have a pivotal role in contributing knowledge about the experience and use of their living environments – without them, local buy-in and outcomes are weakened [128]. Formal networks and other international actors have realised the opportunities within such networks and capitalised on these for improving pandemic response. For example, UNICEF launched in April 2020 the Global Multi-Religious Faith-in-Action COVID-19 Initiative in order to engage religious and community leaders in fighting the pandemic [127,129]. City networks may have the potential to engage more at a community level and thus develop decentralised and localised approaches, which may in turn strengthen communication in pandemic preparedness and response.

4 Discussion

Ten key themes emerged from the literature. These are discussed in Table 3 with recommendations.

The current work has shown that despite city networks not previously addressing resilience against pandemics, they are currently being extensively used for this purpose. City networks thus may contribute to strengthening global collaborative approaches to pandemic responses as they may provide a platform for improved data and information gathering and sharing and subsequently enhancing

Table 2: Leading City Networks

Name	Members	Mission	Examples of response to COVID-19
C40 cities [111]	96 affiliated cities.	To ensure “integrated, systematic and holistic” processes for adaptation to climate shocks.	Launched a dedicated COVID-19 portal that includes a knowledge hub to better support city governments through knowledge sharing, dissemination, and peer networks.
Cities for All (C4ALL) [112]	8 founding cities and sponsors, academic partners, corporate allies, institutional partners, civil society partners.	To provide more accessible cities where the needs of disability communities are considered in local and international decision-making processes to guide urban planning and development.	Gathers experts to highlight the urban pandemic responses especially for older persons and persons with disabilities.
Cities for global health [113]	Co-led by the World Association of the Major Metropolises (Metropolis) and the Euro-Latin-American Alliance of Cooperation among Cities (AL-LAs), supported by United Cities and Local Governments (UCLG).	It fosters initiatives related to health emergencies, such as sanitary crisis or epidemics.	Allows cities to share successful local initiatives (e.g. plans, strategies, policies) designed specifically in response to the COVID-19 pandemic.
Eurocities [114]	Local governments of over 140 of Europe’s largest cities and over 45 partner cities.	To reinforce the role that local governments should play in a multi-level governance structure and shape the opinions and shift the focus of EU legislation in a way which allows city governments to tackle strategic challenges at local the level.	Provides updates on the response of European cities to COVID-19.
MasterCard’s City Possible [115]	Approximately 38 cities and multiple academic and industry partners.	To identify common challenges and develop solutions for more inclusive and sustainable urban development.	Organises regular meetings of municipal decision-makers to exchange strategies on how to address the current crisis.
OECD [116,117]	Cities in OECD countries.	To build resilient cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social and institutional) and promote sustainable development and inclusive growth.	Issues a working document which is updated every 2–3 weeks on the COVID-19 policy responses in various OECD cities for knowledge and experience sharing. Those responses cover six categories: Communication and awareness raising, workplace practices and commuting pattern, social distancing, measures for vulnerable groups, service delivery and economic recovery.
Rockefeller Foundation’s Global Resilient Cities Network – known before as 100 Resilient Cities (100RC) [118]	98 member cities of the former 100 Resilient Cities initiative.	To promote urban resilience action to protect vulnerable communities from climate change and other physical, social and economic urban adversities and challenges.	Organises a weekly speaker series with the World Bank on global responses to COVID-19, as well as a programme to facilitate long-term resilient recovery plans among member cities.
The Global Parliament of Mayors (GPM) [119]	41 mayors of cities across the globe and works closely with 8 networks.	To facilitate debates between mayors, national governments and international organisations, to tackle global and national challenges and opportunities.	Organises webinars that target various challenges associated with COVID-19 pandemic. Initiated the Mayors Act Now campaign to keep mayors informed and connected during the pandemic via intra-city mechanisms.

Table 2 (continued): Leading City Networks

Name	Members	Mission	Examples of response to COVID-19
The Strong Cities Network [120]	140 collaborating cities and municipalities.	To tackle extremism and infodemics.	Uses previously established networks, including the Local Prevention Network (LPN) in Majdal Anjar, Lebanon for supporting current efforts in tackling COVID-19.
UNESCO Creative Cities Network (UCCN) [121]	246 cities.	To promote cooperation with and among cities that have identified creativity and culture as a strategic factor for sustainable urban development.	Provides updates on the response of member cities to COVID-19 using one of the creative fields: literature, design, crafts and folk art, film, music, media arts and gastronomy.
UN HABITAT [122]	Cities in 90 countries, 3,500 partners including Governments, United Nations entities, private sector, foundations and civil society organisations.	To build inclusive, safe, resilient and sustainable cities and communities.	Issued a global crowdsourcing survey for people living in an urban area to help collect data on the COVID-19 city-specific situations. Multiple activities to address the needs of the most vulnerable.
WHO European Healthy Cities Network [123]	100 European cities, 30 national networks and some 1,400 municipalities.	To tackle inequalities and promote good governance and leadership for health and well-being via innovation, knowledge sharing and health diplomacy.	Acts as a platform to share experiences and lessons learned, promote solidarity, and coordinate support in European cities.

Table 3: Discussion and recommendations

Key themes	Discussion	Recommendation
1. Urban resilience	Studies highlight the importance of having a unified and more inclusive definition of urban resilience, especially that it has been inconsistently defined at the intersection of several disciplines that do not share a common theoretical approach or academic methodology [130]. The notion of urban resilience, which should by default include response to pandemics, varies remarkably based on context. Previous research has highlighted the importance of assessing urban resilience by considering the 5 W's (for whom, what, when, where, and why) [130,131]. Other studies also link urban resilience strengthening projects to its core stages preparation, absorption, recovery and adaptation which provides an additional level of understating of urban resilience that could aid in the planning of various initiatives to make sure that all of these stages are covered [34]. Appreciation of the concept of adaptation within broader resilience activities is well understood to enhance the reach and impact of the agenda.	Ultimately, there is a clear understanding that the idea of urban resilience in cities in the Global North, is certainly not the same as for those in the Global South, let alone in conflict settings. Indeed, attempts to map local narratives of urban resistance in several cities in the Global South have highlighted the importance of understanding these diverse narratives for more inclusive resilience policies [132]. While several studies have focused on improving aspects of urban resilience in conflict-affected settings like Baghdad, Iraq and Bamako, Mali [133,134], little is mentioned about such initiatives in cities affected by ongoing armed conflicts in Yemen, Syria, Libya or Afghanistan. In this process, core characteristics of urban resilience, including preparation, absorption, recovery, and adaptation that cut across various geographies should be defined while still taking into account the contextual specificities.

Table 3 (continued): Discussion and recommendations

Key themes	Discussion	Recommendation
2. Lessons learned from previous pandemic responses	A divergence of COVID-19 responses simultaneously emerged, highlighting distinctly inadequate global pandemic preparedness, partly reflected by ineffective global collaboration. The responses have largely failed to incorporate an urban lens with little engagement at the municipal levels, despite the direct influence of urbanisation on the transmission of pandemics. This could be attributed to limited coordination and the lack of standardised sharing mechanisms when it comes to pandemic responses at the international level. Despite having multiple international platforms and organisations to deal with pandemics, currently there exists no international platform for global governance of pandemics with a mandate for cities to share their experiences. Moreover, when reflecting on some of the city networks and collaborations to improve urban resilience to COVID-19, and after more than 15 months into the pandemic, all of the activities so far have only targeted the “preparation”, and at best, the “absorption” phases of resilience with nothing in hand for “recovery” and “adaptation”.	One way forward would be to combine the efforts of WHO, UN Habitat, and United Nations Office for Disaster Risk Reduction (UNDRR) with a specific cross-body and interdisciplinary taskforce to lead the global governance and leadership on this growing challenge while addressing clearly and effectively all of the stages of urban resilience [135].
3. Tension between national and local leadership in responding to pandemics	The impracticality of isolation, quarantine and social distancing in large cities has been challenging for many cities to maintain and has many socio-economic ramifications [136–140]. Examples of responses to protect women during COVID-19 include additional support being allocated to accelerate community-level service delivery for survivors of gender based violence (GBV), with dedicated focus on women in the informal economy, as well as young girls and women affected by other diseases [141]. In Syria, community-level mobilisation and service delivery is also being implemented to provide access to GBV support services and reproductive health services [142].	There is a need for stronger leadership of the crisis that determines how effective and contextually realistic these measures are. For strengthening preparedness, and therefore urban resilience, analysis of the social determinants of health, particularly in slums and other informal settlements, is highly important. It is important to consider carefully the gendered impact as women are particularly disadvantaged by pandemics due to multi-faceted systematic and cultural discriminations [142].
4. Trust building	The importance of maintaining and building trust with clear messaging, community and stakeholder engagement, effective leadership, rapid implementation of control measures, and effective allocation of resources have all been highlighted as critical elements of successful health initiatives, namely pandemic preparedness and response, and yet this seems to have been lost in the urgency of previous international responses [143]. International initiatives responding to the Ebola epidemic focused on immediate treatment responses, the development and delivery of vaccines, security and containment, and large initiatives such as building hospitals with little involvement of local authorities.	Clearer communication and information dissemination are required to ensure campaigns and public policies are coherent, transparent and contextualised. There is therefore an important lesson for early detection and response, to strengthen international partnerships and collaborations as well as local-level and community engagement to support the building of comprehensive health systems for surveillance and care [42].
5. Innovation	Innovation is crucial and has shown to be of great use in many contexts [61]. It is, however, unrealistic to expect that the same “smart” solutions employed in high income countries and cities are applicable in other resource limited settings. SMS text messaging and teleconferences have already been reported to be used for awareness and trainings even in ongoing armed conflict settings like Yemen, Syria and Gaza [144].	Contextualisation of smart solutions is fundamental in responses.

Table 3 (continued): Discussion and recommendations

Key themes	Discussion	Recommendation
6. Decentralisation	Cities represent a subset of power, agency, ideas and progress that is often overlooked in the search for solutions to significant global challenges. However, some national governments are struggling to respond to the current crisis and cities are left to face the COVID-19 threat without adequate support. Decentralisation of governance is key, especially when the central government is not responding effectively at the national level as demonstrated in the UK, Brazil and USA, where local leaders have asserted control of local responses, which are not in accordance with the national policy. Responses to pandemics at the city level demonstrate the growing need for cities to not only work in closer collaboration with national governments, but with one another as interconnected, global city networks.	It is therefore increasingly critical to connect local decision makers with other cities to share knowledge, experience and, where possible, resources. A pandemic preparedness index at the city level may further assist in strengthening pandemic preparedness and responses [19]. The potentials of a good mayor with advanced leadership skills as a source of city leadership is often overlooked. The GPM could be a starting point of improved coordination mechanisms across cities especially those of similar profiles (population, economy, geography).
7. Flexibility and dynamism	Cities are able to effect change with greater flexibility and dynamism than their national counterparts due to their focused remit and devolved governance structures [145]. Cities can add strategic value to existing arrangements and can form multi-city coalitions capable of representing urban interests on a global scale [21]. Harnessing this power to strengthen city networks may be one way of enhancing pandemic responses. Some existing city networks have tailored their current focus and resources to respond to the increasing challenges of cities tackling the COVID-19 pandemic. However, they predominantly focus on knowledge and experience sharing despite having further capabilities that could be capitalised on, especially regarding developing common metrics and data collection methods.	Existing networks and partnerships could provide platforms for urban centred strategies on responding to pandemics. Components of health security – natural disease threats like COVID-19 and man-made security threats like biological and chemical weapons that impact humans, animals, and the environment – should be introduced as key issues to the agendas of these city networks [146].
8. Multi-sector coordination and partnerships	In conflict-affected settings, where cities have minimal power, multi-sector coordination and stronger partnerships with leading humanitarian organisations and universities would assist in improving urban resilience. This would promote evidence-based responses and solutions, facilitating links between key stakeholders, and providing technical guidelines on context-specific solutions while building on existing city networks as facilitators for multi-party coordination, international exposure and advocacy, and resourcing. The composition of cities as more than a hub of governance, but cultural, scholarly and industrial centres offers significant potential for collaboration on the issue of pandemic response.	Universities in particular, affiliated to city geographies as they so frequently are, provide a valuable platform of knowledge and practice around key thematic challenges. Academic networks have repeatedly been drawn on to tackle global risks such as disasters, epidemics, and genocide. Response to pandemics is prime territory for the multi-disciplinary skillsets of higher educational establishments. For instance, in countries where governments are overwhelmed with pandemic-related health service provision, research centres become central in conducting pandemic-related research and in providing pandemic-related information and in providing pandemic related information [147–149]. A further benefit of these institutions is their explicit role as repositories of knowledge and memory, facilitating the production and transfer of evolving understandings of difficult concepts across pre-established global networks.
9. Local informal networks	Stakeholders vested in health system and urban resilience in conflict can use lessons from city collaborations to coordinate multi-disciplinary attention towards the risk landscapes of systems at particular risk during conflict and flares of endemic violence.	Deploying the power of city governance with policymakers, humanitarian actors, informal networks and the private sector has the scope to integrate risk analyses of a critical sector into longitudinal planning for fragile cities and regions. Such an approach requires a departure from traditional approaches led by humanitarian actors.

Table 3 (continued): Discussion and recommendations

Key themes	Discussion	Recommendation
10. Development of new guidance and regulations	The development of new guidance and approaches requires collaboration among large cities, as well as research and evaluation to identify best practices for cities with different resource capabilities, particularly for implementing core capacity requirements under the revised IHR. All national governments have committed themselves to IHR implementation; municipalities must play a central role but may not be aware of their obligations or able to meet them.	Strengthening IHR compliance could build broader capacities with local relevance and thus local buy-in and sustainability. Sharing experiences and research is needed to develop strategies and best practices that can be considered by cities worldwide that share similarities, which may be based on size, population density, and regional challenges, as well as differences on approaches to global challenges.

current legal, health, social and economic frameworks. However, it is too early to determine whether these networks, in their current form, will provide a sustainable route for resilience of cities against pandemics especially in conflict settings. However, these platforms can still be considered as baseline approaches for multisectoral partnerships to allow for comparative city level analysis of the effectiveness of key interventions to improve urban resilience and pandemic preparedness.

5 Limitations

Due to the novelty of the topic of urban resilience and response to COVID-19 at the city level, a significant amount of the research exists in the grey literature. However, this is difficult to track systematically given the large number of cities; languages; disparity in capacities and resources in high-income, low-income and conflict settings. Furthermore, there is a lack of specific data sets of city-based data analysis. The study also included some of the major city networks available on the global scale however, we believe that there are other available networks that we could not source using our keyword search. Desk-based research and the use of secondary sources is a further limitation of this review, impeding the scope for in-depth analysis. Further qualitative research on this evolving topic is recommended. Another limitation is that the search only included reports and journal articles written in English.

6 Conclusion

COVID-19 is not the most lethal pandemic that humans have faced in recent times, however it has highlighted the fragility of systems and societies globally including cities in conflict settings. City networks might provide a

multisectoral and multidisciplinary platform to improve pandemic responses and strengthen resilience in urban conflict settings. Engaging the right stakeholders, ensuring proper communication and knowledge sharing are crucial to provide technical guidelines on effective networks for urban resilience against pandemics. However, contextualization is key especially when working in conflict settings where the dynamics vary tremendously from one conflict to another. Shared knowledge between cities in these cases would offer an invaluable portal for analysis to facilitate enhanced understanding of the complexity of the phenomenon under discussion.

Abbreviations

100RC	100 Resilient Cities
CEPI	Coalition for Epidemic Preparedness Innovations
C4ALL	Cities for All
DRC	Democratic Republic of Congo
EVD	Ebola Virus Disease
GHSa	Global Health Security Agenda
GISAID	Global Initiative on Sharing All Influenza Data
GloPID-R	Global Research Collaboration For Infectious Disease Preparedness
GOARN	Global Outbreak Alert and Response Network
GCRN	Global Resilient Cities Network
GPM	Global Parliament of Mayors
H1N1	Pandemic Influenza A

IASC	Inter-Agency Standing Committee
ICRC	International Committee of the Red Cross
IDP	Internally displaced persons
IHR	International Health Regulations
IRC	International Rescue Committee
JEE	Joint External Evaluation
LMIC	Low and Middle-Income Country
LPN	Local Prevention Network
MENA	Middle East and North Africa
MERS	Middle East Respiratory Syndrome
MSF	Médecins Sans Frontières
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
PPE	Personal protective equipment
R4HC-MENA	Research for Health in Conflict in the Middle East and North Africa
RUHSA	Rapid Urban Health Security Assessment
SARS	Severe Acute Respiratory Syndrome
SDG	Sustainable Development Goals
SDI	Slum Dwellers International
STAG-IH	Strategic and Technical Advisory Group for Infectious Hazards
UCLG	United Cities and Local Governments
UK	United Kingdom
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs

UNRWA	United Nations Relief and Work Agencies for Palestine Refugees in the Near East
WEF	World Economic Forum
WFP	World Food Programme
WHO	World Health Organisation

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